

REMARKS

Claim Status

Claims 1-4 are pending. The specification has been amended to correct minor typographical errors. Claims 1 and 3 have been amended. Support for the amendment to claims 1 and 3 may be found, for example, at pg. 4, lines 17-21 of the originally-filed specification. No new matter has been added. Reconsideration of the application is respectfully requested.

Summary of the disclosed subject matter

A structure is disclosed which is capable of connecting a dielectric waveguide resonator to a microstrip line without forming an input/output electrode on the resonator to thereby facilitate application of the dielectric waveguide resonator to an electronic circuit even if the resonator is intended for use in the millimetric-wave band (see pg. 2, lines 10-14 of the originally filed specification). This is achieved by forming slots, respectively, in the surface of a dielectric waveguide resonator and a conductive film connected with a microstrip line, and coupling the dielectric waveguide resonator with a microstrip line through these slots (see pg. 2, lines 15-18 of the originally filed specification).

Independent claim 1 relates to an input/output coupling structure for a dielectric waveguide resonator to be mounted on a printed circuit board. The input/output coupling structure comprises: a region defined in the printed circuit board and surrounded by a first conductive film formed on the front surface of the printed circuit board and connected to a microstrip line on the printed circuit board, a second conductive film formed on the back surface of the printed circuit board, and a conductive wall connecting the respective peripheries of the first and second conductive films. A first slot is formed in the front surface of the region, and a second slot is formed in a surface of the dielectric waveguide resonator which is disposed so as

to be opposed to the region of the printed circuit board. The first and second slots are adapted to be disposed in opposed relation to one another so to create a structure wherein input/output coupling is formed by only the printed circuit board and the dielectric waveguide. Consequently, electromagnetic energy can be confined within the printed circuit board and the dielectric waveguide. This provides substantial advantages over prior art structures, since the number of required parts of the claimed invention can be minimized, and the structure is quite thin and simple. In independent claim 3, the region defined in the printed circuit board is a mode conversion region, and the microstrip line on the printed circuit board is a TEM-mode microstrip line.

Patentability of the Claims under 35 U.S.C. §103

Claims 1-4 stand rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,422,611 ("*Kashima*") in view of U.S. Patent No. 4,725,798 ("*Igarashi*"). Reconsideration of this rejection in view of the following remarks is respectfully requested.

Kashima relates to "a waveguide-microstripline transformer for receiving single polarized waves that comprises a waveguide having a slit at a side wall thereof, a dielectric substrate plate placed on the slit, a microstripline which functions as a probe on the dielectric substrate plate, and a shield case covering the dielectric substrate plate" (see col. 2, lines 14-22).

As shown in Figs. 1(a) and 1(b) of *Kashima*, the waveguide-microstripline transformer has a cavity waveguide 6 with a slot 7 that is formed on a wall 37 thereof. It is noted that *Kashima* does not disclose that a slot must also be formed on the dielectric substrate plate 8. Nothing is explicitly stated about such a slot, nor is it shown in Fig. 1(b) which, if such a slot exists, should show it in the cross-sectional view above slit 7. The Examiner assumes the existence of such a "slot in the middle of copper foil 11," but *Kashima* does not appear to disclose it. If the Examiner

insists on retaining a contrary view, then a showing by the Examiner of clear support therefore in the reference is respectfully solicited.

In addition, a shield case 10 is needed by *Kashima* in order to form an enclosed space above the dielectric substrate plate 8. As a result, the structure disclosed in *Kashima*, having the dielectric substrate plate 8 located between the cavity waveguide 6 and the shield case 10, not only increases the number of parts and steps necessary to fabricate the device but also creates a major obstacle to miniaturizing the device. *Kashima* fails to teach a structure wherein input/output coupling is formed by only the printed circuit board and the dielectric waveguide, as recited in amended claims 1 and 3.

Igarashi relates to “a waveguide filter comprising waveguide resonators each made of a rectangular dielectric on the periphery of which a metal film is provided, whereby its center frequency and passband width can be set precisely and its body can be miniaturized” (see pg. 4, lines col. 23-28). *Igarashi* discloses a waveguide filter having a general microstripline-dielectric waveguide transformer structure that is used in the conventional manner. In such a structure, some electrodes must be formed in the dielectric waveguide. The fabrication of such a structure is complicated and, thus, expensive. *Igarashi* fails to cure the deficiency of *Kashima*, because *Igarashi* also fails to teach a structure wherein input/output coupling is formed by only a printed circuit board and a dielectric waveguide.

In view of the foregoing, amended independent claims 1 and 3 are patentable over the combination of *Kashima* and *Igarashi*. Consequently, reconsideration and withdrawal of the rejection of claims 1 and 3 under 35 U.S.C. §103(a) are respectfully requested.

Dependent claims

In view of the patentability of independent claims 1 and 3, for the reasons presented above, dependent claims 2 and 4 are patentable therewith over the prior art.

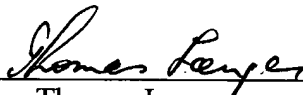
Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,

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